

SURVEY OF WATER QUALITY
AND FLOW IN MARYLAND
COASTAL ZONE STREAMS:
A DATA REPORT

Prepared by

Ecological Analysts, Inc.
HUNT VALLEY/LOVETON CENTER
15 Loveton Circle
Sparks, Maryland 21152

INFORMATION CENTER

COASTAL ZONE

May 1983

YLAND POWER PLANT SITING PROGRAM

ENT OF NATURAL RESOURCES ■ DEPARTMENT OF HEALTH AND MENTAL
■ DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT ■ DE-
PARTMENT OF STATE PLANNING ■ DEPARTMENT OF TRANSPORTATION ■ DEPART-
MENT OF AGRICULTURE ■ COMPTROLLER OF THE TREASURY ■ PUBLIC SERVICE
COMMISSION

TD
224
.M3
S87
1983



SURVEY OF WATER QUALITY
AND FLOW IN MARYLAND
COASTAL ZONE STREAMS:
A DATA REPORT

U.S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

Prepared for

Department of Natural Resources
Power Plant Siting Program
Tawes State Office Building, B-3
Annapolis, Maryland 21401

Prepared by

Ecological Analysts, Inc.
HUNT VALLEY/LOVETON CENTER
15 Loveton Circle
Sparks, Maryland 21152

Property of CSC Library

May 1983

TD 224 M3 587 1983
11865877
DEC 02 1986

CONTENTS

	<u>Page</u>
ABSTRACT	
FOREWORD	
1. INTRODUCTION	1-1
2. METHODS	2-1
3. RESULTS	3-1

FOREWARD

The purpose of this report is to present data collected during a two-month pilot study of water chemistry of freshwater tributaries to the Chesapeake Bay. The streams studied represent spawning habitat for various species of anadromous fish. This report is one of a series in a program directed toward assessing the significance of acid deposition to Maryland's resources.

Ecological Analysts, Inc. performed this study under Contract P 57-83-02 with the Maryland Department of Natural Resources Power Plant Siting Program.

Michael L. Bowman
Associate Administrator
Technical Affairs
Power Plant Siting Program

1. INTRODUCTION

Ecological Analysts was retained by the Maryland Department of Natural Resources Power Plant Siting Program to gather data pertaining to the potential impact of acid deposition on the water quality of small fresh-water tributaries in the Chesapeake Bay drainage system. The 23 streams chosen for this study, identified in Table 1 and Figure 1, were selected from a list of 50 known spawning sites for anadromous species (alewife, blueback herring, white perch, and yellow perch) based upon a consideration of stream width (generally less than 6 m [20 ft]), stream cover (including both forested and open areas), and accessibility. In addition, an effort was made to include tributaries to each of the major drainage systems of the upper Bay--Potomac, Patuxent, Susquehanna, Choptank, and Nanticoke river basins.

Each site was visited weekly during the months of March and April 1983. Streamflow, pH, temperature, dissolved oxygen, and specific conductance were determined in the field, and samples were collected for laboratory analysis (alkalinity, dissolved aluminum, sulfate, and nitrate).

Three streams--Broad Run, Church Creek, and Deer Creek--were designated for additional sampling associated with "precipitation events," defined operationally as the passage of a closed low-pressure system, a front, or a thunderstorm producing a minimum of 0.64 centimeters (0.25 in.) of rainfall. The purpose of this wet weather sampling was to provide a means of detecting changes in water quality in response to storm events; however, the period of study proved so unusually wet that the regular weekly data cannot be considered representative of dry weather conditions.

The field and laboratory methods used in the study are described in Section 2. Section 3 presents the data.

TABLE 1 SAMPLING STATION LOCATION AND LAND USE

Site No.	Stream Name	Station Location	Land Use ^(a)		County
			Flood Plain	Upland	
1	Nanjemoy Creek	Md. 6	DF	DF	Charles
2	Mattawoman Creek unnamed tributary	Bumpy Oak Road	DF	DF	Charles
3	Wheatley Run	Md. 6	DF	DF	Charles
4	Plum Point Creek	Md. 263	DF/M	DF/AG/G	Calvert
5	Lyons Creek	Md. 4	DF	DF	Calvert
6	Magothy River	Md. 648	DF	DF	Anne Arundel
7	Severn Run	Dicus Mill Road	DF	DF	Anne Arundel
8	North River	Md. 450	DF/M	DF	Anne Arundel
9	Muddy Creek	Md. 468	DF	DF	Anne Arundel
10	Stocketts Run	Sands Road	DF	DF	Anne Arundel
11	Broad Run	Mt. Vista Road	DF	DF/AG	Baltimore
12	Deer Creek	Md. 161	DF	DF/G	Harford
13	Church Creek	U.S. 40	M/DF	DF	Harford
14	Winters Run	Md. 755	DF	DF/G	Harford
15	Great Bohemia Creek	Telegraph Road	DF	AG	Cecil
16	Long Branch	Md. 213	M/MF	MF	Cecil
17	Stony Run	Razor Strap Road	DF	DF/G	Cecil
18	Cypress Branch	Md. 291	DF	DF/R	Kent
19	Morgan Creek	Perkins Hill Road	DF	DF/AG	Kent
20	Herring Branch	Md. 299	DF	DF/AG	Kent
21	Granny Finley Branch	Sparks Mill Road	DF	DF	Queen Anne's
22	Choptank River	Red Bridges Road	DF	DF	Caroline
23	Tull Branch	Smithville Raod	DF	MF	Caroline

(a) Land Use

G = grassland

M = marsh

R = residential

AG = agricultural land

DF = deciduous forest

MF = mixed deciduous and coniferous forest

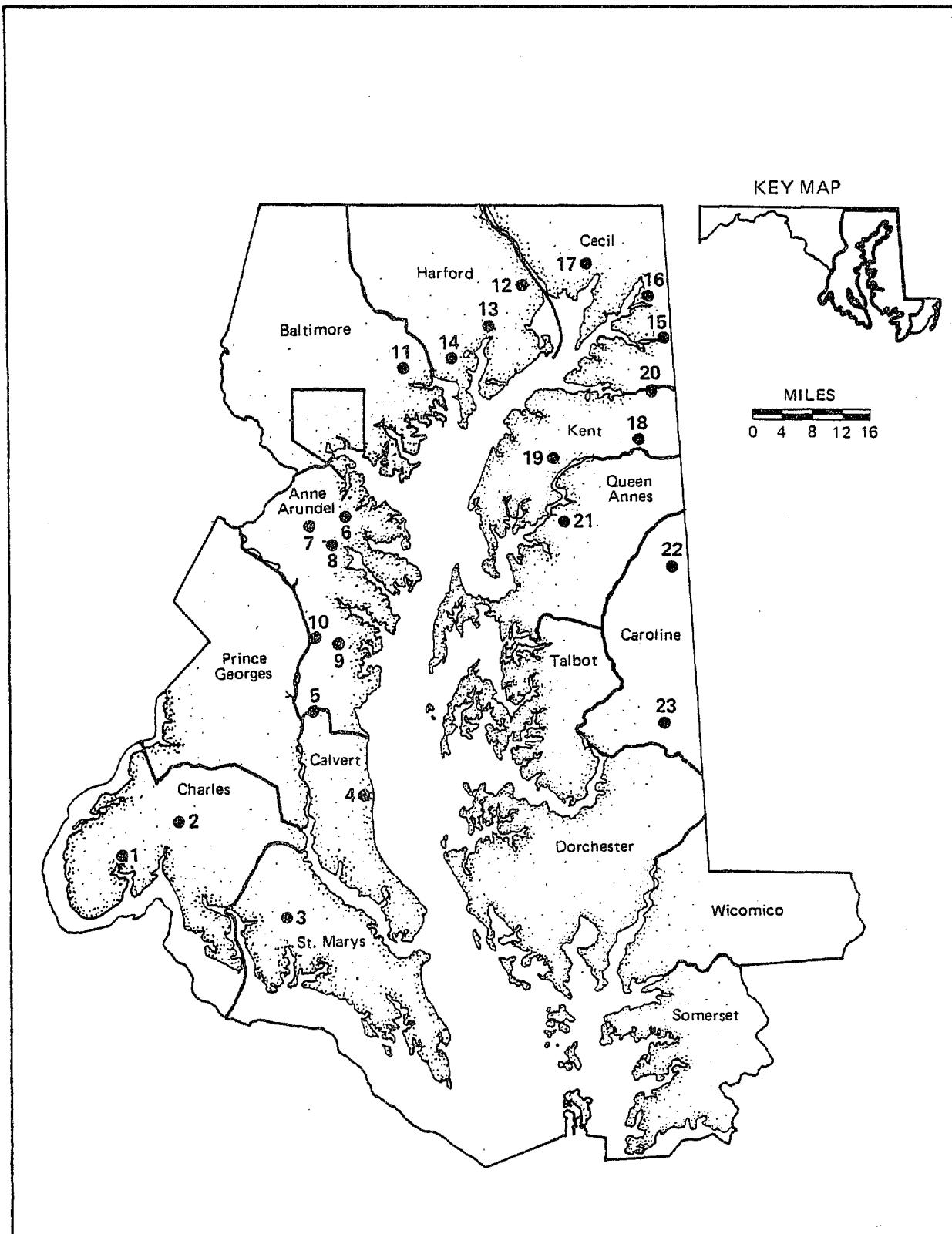


Figure 1. Location of sampling stations (see Table 1 for names of streams and precise locations of sampling points).

2. METHODS

2.1 FLOW MEASUREMENT

Either a Teledyne Gurley Model 665 or Pygmy Model 625 current meter was used to measure streamflow. The former was used primarily when measurements had to be made from bridges, whereas the latter was used when wading was possible. These instruments were calibrated before and after use at the controlled velocity flume maintained at the Chesapeake Bay Institute. Water depth and velocity readings were taken at 10 stations across the stream. Velocity measurements were made at 0.6 depth below the surface in water depths less than 0.75 meters (2.5 ft). In depths greater than 0.75 meters, measurements were made at 0.2 and 0.8 depth below the surface. Stream discharge (m^3/sec) was calculated by adding the products of cross-sectional area and average velocity for the 10 stations across the stream. The estimated accuracy of the stream discharge value is ± 10 percent.

At Deer Creek, high water usually prevented use of the method described above, and flows were estimated from measurements of current velocity and depth of water flowing over the spillway of a dam upstream of Md. Route 161.

2.2 ANALYTICAL METHODS

Summaries of the methods of chemical analysis employed in this study are listed in Table 2.

TABLE 2 SUMMARY OF ANALYTICAL METHODS

<u>Parameter</u>	<u>Method No. (a)</u>	<u>Summary of Method</u>	<u>Accuracy (% Recovery except as indicated)</u>	<u>Precision</u>	<u>Detection Limit</u>
Conductance	120.1	Conductivity meter (in situ)	95-105	<5	--
pH	150.1	Electrometric (in situ)	±0.1 unit	±0.1 unit	--
Temperature	170.1	Thermistor (in situ)	±0.2 C	±0.2 C	--
Dissolved oxygen	360.1	Membrane electrode (in situ)	95-105	±0.1 mg/l	--
Dissolved aluminum	200 (Sec. 4.1.1) 202.2	Filtration through 0.45 micron filter Atomic absorption spectrometry, furnace	85-110	<3(b) --	3 µg/l
Total alkalinity	310.1	Titrimetric to pH 4.5	--	<4(b)	1 mg/l
Nitrite and nitrate	352.3	Colorimetric, automated cadmium reduction	95-120	<3(b)	0.01 mg/l
Sulfate	375.2	Colorimetric, automated methyl-thymol blue	80-115	<5(b)	2 mg/l

(a) U.S. Environmental Protection Agency, 1979. Methods for Chemical Analysis of Water and Wastes. Environmental Monitoring and Support Laboratory, Cincinnati.

(b) As percent coefficient of variation = 100 percent x (standard deviation/mean).

3. RESULTS

Tables 3 through 10 contain the results of the weekly data collection at all 23 sampling stations. The results for Broad Run, Church Creek, and Deer Creek on 7, 18, and 21 March 1982 during or following precipitation events are presented in Tables 11 through 13. Caution should be used in the analysis and interpretation of the data for two reasons. First, two of the streams, Church Creek and Long Branch, are tidal. Consequently, any attempt to relate streamflow to rainfall intensity is not likely to be productive. (Flow measurements were terminated when it became obvious that the streams were tidal.) Second, it should not be inferred that the data in Tables 3 through 10 correspond to dry weather. In many cases, there was either rain on the day of sampling or high water as a result of heavy rain in the period prior to sampling.

TABLE 3 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL ZONE STREAMS DURING THE WEEK OF 6-12 MARCH 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman					
	Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	8 MAR	8 MAR	8 MAR	8 MAR	8 MAR	7 MAR
Time	0930	1127	1310	1435	1615	1630
Temp (C)	10.1	8.2	10.2	8.7	8.8	10.1
pH	5.5	6.3	6.2	6.7	6.3	6.9
DO (mg/l)	10.5	12.6	11.4	10.7	11.8	11.8
Conductivity ($\mu\text{mho}/\text{cm}$)	56	94	80	123	123	185
Width (m)	9.75	3.35	3.50	6.10	5.18	4.72
Avg. depth (m)	0.65	0.18	0.11	0.54	0.57	0.15
Flow (m^3/sec)	1.19	0.15	0.09	0.37	1.47	0.08
Alkalinity (mg $\text{CaCO}_3/1$)	5	6.2	6.9	21.9	9.4	13.1
Dissolved Al (mg/l)	0.36	0.5	0.16	0.23	0.5	0.28
NO_3^- -N (mg/l)	0.04	0.53	0.30	0.13	0.98	1.24
SO_4^{2-} (mg/l)	11	12	10	17	24	18

Parameter	Stream Name (and Site Number)					
	Severn					
	Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	9 MAR	11 MAR	9 MAR	9 MAR	9 MAR	9 MAR
Time	1140	1400	0832	0938	1614	1535
Temp(C)	7.7	7.8	7.2	7.2	7.5	7.5
pH	6.0	6.1	5.4	6.4	6.9	6.9
DO (mg/l)	11.5	11.4	10.2	12.2	11.7	12.7
Conductivity ($\mu\text{mho}/\text{cm}$)	108	80	104	90	70	128
Width (m)	7.32	10.97	3.35	4.32	3.96	28.65
Avg. depth (m)	0.52	1.23	0.14	0.24	0.20	0.52
Flow (m^3/sec)	1.52	0.90	0.04	0.45	0.17	9.33
Alkalinity (mg $\text{CaCO}_3/1$)	5.6	3.1	3.1	9.4	22.5	24.4
Dissolved Al (mg/l)	0.8	0.37	0.26	0.27	0.24	0.4
NO_3^- -N (mg/l)	0.49	0.24	0.51	0.97	1.21	2.2
SO_4^{2-} (mg/l)	16	14.5	25	24	12	10

TABLE 3 (CONT.)

Parameter	Stream Name (and Site Number)					
	Church Creek (13)	Winters Run (14)	Great Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	10 MAR	7 MAR	10 MAR	10 MAR	10 MAR	10 MAR
Time	0932	1435	1247	1203	1055	1519
Temp(C)	6.7	10.6	8.3	7.3	6.4	7.7
pH	6.6	7.4	6.9	6.4	6.6	5.8
DO (mg/l)	11.7	12.6	11.8	11.6	12.9	11.7
Conductivity ($\mu\text{mho}/\text{cm}$)	109	99	171	101	2	2
Width (m)	10.06	23.16	5.18	7.92	9.75	16.15
Avg. depth (m)	1.31	0.64	0.16	0.89	0.49	0.64
Flow (m^3/sec)	3.26	2.52	0.18	1.08	5.36	4.57
Alkalinity (mg $\text{CaCO}_3/1$)	14.4	26.9	38.8	10.0	6.9	1.9
Dissolved Al (mg/l)	2.1	0.19	0.25	0.6	4.0	0.6
NO_3^- -N (mg/l)	0.36	1.76	2.4	0.91	0.49	0.71
SO_4^{2-} (mg/l)	13	10	19	17	12	13

Parameter	Stream Name (and Site Number)				
	Morgan Creek (19)	Herring Branch (20)	Granny Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	10 MAR	10 MAR	11 MAR	11 MAR	11 MAR
Time	1611	1402	0848	1004	1133
Temp (C)	8.0	7.7	7.7	8.2	9.1
pH	7.1	6.0	6.5	6.0	6.2
DO (mg/l)	10.0	11.8	11.2	10.7	11.0
Conductivity ($\mu\text{mho}/\text{cm}$)	186	2	152	105	154
Width (m)	4.36	3.05	5.03	15.24	4.27
Avg. depth (m)	0.45	0.38	0.49	0.85	0.49
Flow (m^3/sec)	0.69	0.45	0.42	10.64	0.21
Alkalinity (mg $\text{CaCO}_3/1$)	41.5	6.2	18.1	7.2	7.2
Dissolved Al (mg/l)	2.2	0.5	0.6	0.8	0.27
NO_3^- -N (mg/l)	1.21	0.56	2.2	0.99	6.1
SO_4^{2-} (mg/l)	10.3	10.8	12.4	17.4	9.1

TABLE 4 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL ZONE STREAMS DURING THE WEEK OF 13-19 MARCH 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman Creek Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	14 MAR	14 MAR	14 MAR	14 MAR	14 MAR	15 MAR
Time	0953	0830	1122	1342	1509	1128
Temp (C)	6.3	4.4	8.9	10.6	9.6	9.5
pH	5.6	5.9	5.8	6.3	6.3	6.3
DO (mg/l)	11.0	12.0	10.8	12.4	11.8	11.8
Conductivity ($\mu\text{mho}/\text{cm}$)	55	82	76	123	144	155
Width (m)	9.60	3.35	3.50	3.66	4.72	3.96
Avg. depth (m)	0.40	0.12	0.11	0.22	0.40	0.15
Flow (m^3/sec)	0.27	0.05	0.06	0.17	0.86	0.06
Alkalinity (mg CaCO_3/l)	4.8	6.2	5.0	18.8	8.1	12.5
Dissolved Al (mg/l)	0.26	0.10	0.06	0.12	0.09	0.31
NO_3^- -N (mg/l)	0.03	0.59	0.26	0.18	0.19	1.00
SO_4^{2-} (mg/l)	11	12	11	21	28	20

Parameter	Stream Name (and Site Number)					
	Severn Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	15 MAR	15 MAR	14 MAR	14 MAR	15 MAR	15 MAR
Time	1013	0856	1612	1704	1302	1409
Temp(C)	8.1	5.9	10.6	9.3	10.8	9.5
pH	6.0	5.6	5.6	6.3	6.5	6.8
DO (mg/l)	11.7	11.6	12.3	11.7	11.6	13.1
Conductivity ($\mu\text{mho}/\text{cm}$)	108	87	109	128	122	116
Width (m)	6.02	4.27	3.20	4.27	3.73	28.35
Avg. depth (m)	0.34	0.26	0.13	0.20	0.16	0.36
Flow (m^3/sec)	0.40	0.21	0.03	0.35	0.08	4.91
Alkalinity (mg CaCO_3/l)	7.5	37.5	2.5	8.8	27.8	23.1
Dissolved Al (mg/l)	0.29	0.07	0.09	0.11	0.14	0.06
NO_3^- -N (mg/l)	1.03	0.23	0.47	1.01	1.51	2.7
SO_4^{2-} (mg/l)	16	15	28	27	10	10

Note: NDT - Not determined because stream is tidal.

TABLE 4 (CONT.)

Parameter	Stream Name (and Site Number)					
	Church Creek (13)	Winters Run (14)	Great Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	16 MAR	15 MAR	16 MAR	16 MAR	16 MAR	16 MAR
Time	0800	1543	1426	1223	1120	1650
Temp(C)	8.6	10.8	11.0	9.0	7.9	11.6
pH	6.0	6.8	7.8	6.2	6.4	5.9
DO (mg/l)	9.2	12.8	12.6	11.1	11.5	11.1
Conductivity ($\mu\text{mho}/\text{cm}$)	127	123	160	220	84	73
Width (m)	NDT	23.16	4.88	13.11	7.09	5.69
Avg. depth (m)	NDT	0.45	0.68	0.71	0.16	0.35
Flow (m^3/sec)	NDT	1.74	0.14	0.46	0.23	1.65
Alkalinity (mg $\text{CaCO}_3/1$)	30.6	24.4	39.4	11.2	12.5	4.4
Dissolved Al (mg/l)	0.20	0.10	0.12	0.17	0.14	0.31
NO_3^- -N (mg/l)	0.09	2.1	3.0	1.30	0.57	0.95
SO_4^{2-} (mg/l)	13	12	20	19	13	13

Parameter	Stream Name (and Site Number)				
	Morgan Creek (19)	Herring Branch (20)	Granny Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	17 MAR	16 MAR	17 MAR	17 MAR	17 MAR
Time	0845	1537	1007	1136	1255
Temp (C)	6.0	11.8	7.2	9.0	9.5
pH	6.7	6.1	6.6	6.1	6.2
DO (mg/l)	10.6	11.2	11.8	11.1	11.8
Conductivity ($\mu\text{mho}/\text{cm}$)	140	74	155	113	148
Width (m)	4.27	2.74	4.88	15.24	4.27
Avg. depth (m)	0.26	0.39	0.67	0.38	0.15
Flow (m^3/sec)	0.16	0.13	0.26	3.96	0.19
Alkalinity (mg $\text{CaCO}_3/1$)	32.1	10.0	25.9	8.5	7.0
Dissolved Al (mg/l)	0.25	0.31	0.20	0.31	0.11
NO_3^- -N (mg/l)	2.3	0.90	4.0	1.07	6.8
SO_4^{2-} (mg/l)	9	13	12	19	9

TABLE 5 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL ZONE STREAMS DURING THE WEEK OF 20-26 MARCH 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman					
	Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	22 MAR	22 MAR	22 MAR	22 MAR	22 MAR	23 MAR
Time	1000	0830	1200	1340	1500	1200
Temp (C)	9.8	7.2	11.2	9.8	9.9	9.5
pH	6.3	6.7	6.4	6.6	6.6	6.5
DO (mg/l)	10.4	12.2	11.9	11.4	11.8	10.6
Conductivity ($\mu\text{mho}/\text{cm}$)	48	74	73	112	124	126
Width (m)	9.55	3.35	3.66	5.94	5.18	3.96
Avg. depth (m)	0.69	0.18	0.19	1.08	0.69	0.16
Flow (m^3/sec)	1.76	0.15	0.22	1.17	1.90	0.14
Alkalinity (mg CaCO_3/l)	4.1	7.2	6.2	16.6	6.2	14.0
Dissolved Al (mg/l)	0.5	0.30	0.19	0.02	2.2	1.5
$\text{NO}_3\text{-N}$ (mg/l)	0.01	0.54	0.30	0.13	0.90	0.69
SO_4^2- (mg/l)	12	12	12	19	24	16

Parameter	Stream Name (and Site Number)					
	Severn					
	Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	23 MAR	23 MAR	22 MAR	23 MAR	23 MAR	23 MAR
Time	1050	0950	1710	0840	1400	1510
Temp(C)	6.8	4.5	9.2	5.0	8.0	6.5
pH	6.4	6.9	6.6	7.1	6.9	6.9
DO (mg/l)	11.8	13.0	12.9	13.5	12.0	13.6
Conductivity ($\mu\text{mho}/\text{cm}$)	96	67	110	118	120	122
Width (m)	6.10	4.57	3.40	4.57	3.40	39.93
Avg. depth (m)	0.75	0.34	0.18	0.27	0.30	0.18
Flow (m^3/sec)	0.73	0.47	<0.06*	0.49	0.13	4.45
Alkalinity (mg CaCO_3/l)	4.1	2.1	3.1	7.2	21.2	20.2
Dissolved Al (mg/l)	0.5	0.18	0.34	0.20	0.16	0.38
$\text{NO}_3\text{-N}$ (mg/l)	0.61	0.16	0.52	1.06	1.40	2.5
SO_4^2- (mg/l)	20	16	26	25	10	11

Note: * - Stream clogged with debris; velocity below instrument threshold.

NDT - Not determined because stream is tidal.

TABLE 5 (CONT.)

Parameter	Stream Name (and Site Number)					
	Church Creek (13)	Winters Run (14)	Great Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	23 MAR	24 MAR	24 MAR	24 MAR	24 MAR	24 MAR
Time	1545	0830	1145	1100	1000	1325
Temp (C)	8.2	4.2	7.5	5.0	3.8	6.3
pH	6.8	6.4	6.8	6.6	7.0	6.6
DO (mg/l)	13.7	13.0	12.2	12.8	13.2	11.6
Conductivity ($\mu\text{mho}/\text{cm}$)	121	116	90	82	74	58
Width (m)	NDT	22.25	4.88	NDT	7.48	16.46
Avg. depth (m)	NDT	0.52	0.16	NDT	0.19	0.67
Flow (m^3/sec)	NDT	2.60	0.24	NDT	0.39	3.03
Alkalinity (mg $\text{CaCO}_3/1$)	19.7	18.6	17.6	6.2	10.4	5.2
Dissolved Al (mg/l)	0.02	0.14	3.7	0.5	0.14	0.8
$\text{NO}_3\text{-N}$ (mg/l)	0.27	4.0	0.99	1.12	0.68	0.70
SO_4 (mg/l)	12	22	18	19	22	13

Parameter	Stream Name (and Site Number)				
	Morgan Creek (19)	Herring Branch (20)	Granny Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	24 MAR	24 MAR	24 MAR	25 MAR	25 MAR
Time	1430	1235	1600	0845	1000
Temp (C)	5.5	6.7	5.6	4.7	4.9
pH	6.6	6.7	6.7	6.4	6.6
DO (mg/l)	12.0	11.9	13.2	11.4	13.2
Conductivity ($\mu\text{mho}/\text{cm}$)	141	53	137	92	155
Width (m)	4.27	2.90	4.88	15.24	4.36
Avg. depth (m)	0.36	0.37	0.48	0.78	0.53
Flow (m^3/sec)	0.23	0.32	0.49	8.53	0.28
Alkalinity (mg $\text{CaCO}_3/1$)	22.8	4.1	24.8	18.6	21.7
Dissolved Al (mg/l)	1.8	0.8	0.5	0.8	0.18
$\text{NO}_3\text{-N}$ (mg/l)	2.5	0.54	3.0	1.01	6.7
SO_4 (mg/l)	13	13	16	20	12

TABLE 6 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL
ZONE STREAMS DURING THE WEEK OF 27 MARCH - 2 APRIL 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman Creek Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	29 MAR	29 MAR	29 MAR	29 MAR	29 MAR	28 MAR
Time	0845	0745	1005	1135	1235	1200
Temp (C)	7.4	6.6	8.8	8.9	8.8	4.0
pH	5.2	5.7	5.3	5.3	5.6	6.2
DO (mg/l)	9.9	11.3	11.3	11.1	11.1	10.4
Conductivity ($\mu\text{mho}/\text{cm}$)	1075	68	1263	111	128	118
Width (m)	9.60	3.35	3.35	5.79	5.18	3.96
Avg. depth (m)	0.65	0.16	0.16	0.82	0.56	0.29
Flow (m^3/sec)	1.58	0.11	0.15	0.57	1.51	0.42
Alkalinity (mg CaCO_3/l)	1.0	4.1	3.1	17.6	8.3	9.8
Dissolved Al (mg/l)	0.22	0.27	0.22	<0.002	0.12	0.18
NO_3^- -N (mg/l)	<0.01	0.51	0.31	0.16	1.06	0.84
SO_4^{2-} (mg/l)	16	16	15	22	28	17

Parameter	Stream Name (and Site Number)					
	Severn Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	28 MAR	28 MAR	28 MAR	28 MAR	28 MAR	28 MAR
Time	1300	1400	1515	1615	0745	0915
Temp (C)	8.0	8.6	9.9	8.5	6.5	6.2
pH	5.1	5.1	5.4	7.0	6.4	6.3
DO (mg/l)	10.4	10.5	10.6	10.7	11.6	12.0
Conductivity ($\mu\text{mho}/\text{cm}$)	54	57	273	105	89	87
Width (m)	NDF	4.57	3.54	4.51	3.81	39.93
Avg. depth (m)	NDF	0.44	0.16	0.30	0.35	0.36
Flow (m^3/sec)	NDF	0.72	0.08	0.70	0.28	17.36
Alkalinity (mg CaCO_3/l)	0.5	<0.5	1.0	7.2	16.6	17.6
Dissolved Al (mg/l)	2.1	0.08	0.26	0.28	1.1	0.8
NO_3^- -N (mg/l)	0.26	0.15	0.47	0.86	1.06	1.61
SO_4^{2-} (mg/l)	15	16	26	26	18	15

Note: NDF - Not determined because of flooding.
NDT - Not determined because stream is tidal.

TABLE 6 (CONT.)

Parameter	Stream Name (and Site Number)					
	Church Creek (13)	Winters Run (14)	Great Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	28 MAR	28 MAR	30 MAR	30 MAR	30 MAR	30 MAR
Time	0945	1025	1015	0945	0845	1150
Temp (C)	6.5	6.7	7.9	5.3	3.6	7.8
pH	6.5	6.4	5.8	5.6	5.4	5.5
DO (mg/l)	11.7	11.4	11.0	11.1	12.9	10.8
Conductivity ($\mu\text{mho}/\text{cm}$)	59	61	127	76	69	52
Width (m)	NDT	22.71	4.88	NDT	7.47	15.24
Avg. depth (m)	NDT	0.99	0.18	NDT	0.19	0.75
Flow (m^3/sec)	NDT	9.94	0.48	NDT	0.47	3.17
Alkalinity (mg $\text{CaCO}_3/1$)	9.3	10.4	24.8	16.7	9.3	3.1
Dissolved Al (mg/l)	1.1	0.5	1.8	0.19	<0.002	0.8
NO_3^- -N (mg/l)	0.27	0.72	7.6	1.12	0.87	0.85
SO_4^{3-} (mg/l)	14	13	19	14	18	10

Parameter	Stream Name (and Site Number)				
	Morgan Creek (19)	Herring Branch (20)	Granny Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	30 MAR	30 MAR	30 MAR	30 MAR	30 MAR
Time	1250	1100	1400	1525	1640
Temp (C)	6.1	8.0	7.5	8.6	10.1
pH	5.6	5.4	5.8	5.6	5.5
DO (mg/l)	10.5	10.1	10.7	10.1	10.7
Conductivity ($\mu\text{mho}/\text{cm}$)	130	49	130	76	141
Width (m)	4.27	2.90	4.91	15.39	4.42
Avg. depth (m)	0.36	0.36	0.47	1.04	0.58
Flow (m^3/sec)	0.26	0.31	0.45	12.25	0.24
Alkalinity (mg $\text{CaCO}_3/1$)	24.8	7.2	14.5	8.3	4.1
Dissolved Al (mg/l)	3.0	1.1	0.16	1.8	0.12
NO_3^- -N (mg/l)	2.9	0.60	2.9	0.87	6.6
SO_4^{3-} (mg/l)	13	11	13	16	10

TABLE 7 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL ZONE STREAMS DURING THE WEEK OF 3-9 APRIL 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman Creek Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	5 APR	5 APR	5 APR	5 APR	5 APR	4 APR
Time	0900	0810	1030	1135	1240	1230
Temp (C)	10.1	7.3	11.0	10.0	10.6	11.8
pH	5.7	5.9	5.7	6.0	6.0	5.9
DO (mg/l)	9.3	11.0	10.3	11.5	10.6	9.2
Conductivity ($\mu\text{mho}/\text{cm}$)	44	69	70	119	141	131
Width (m)	9.60	3.35	3.50	5.79	4.88	3.99
Avg. depth (m)	0.60	0.15	0.16	0.84	0.47	0.18
Flow (m^3/sec)	0.75	0.09	0.17	0.40	1.15	0.14
Alkalinity (mg $\text{CaCO}_3/1$)	5.2	5.2	5.2	21.7	9.3	12.4
Dissolved Al (mg/l)	0.21	0.17	0.16	0.20	0.40	0.5
NO_3^- -N (mg/l)	0.04	0.57	0.36	0.20	1.01	0.95
SO_4^{2-} (mg/l)	8	10	8	16	23	15

Parameter	Stream Name (and Site Number)					
	Severn Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	4 APR	4 APR	4 APR	4 APR	4 APR	4 APR
Time	1330	1520	1700	1615	1100	0945
Temp (C)	11.2	15.6	14.8	12.6	9.5	9.6
pH	6.0	5.6	5.8	6.0	5.9	5.9
DO (mg/l)	9.6	9.5	10.5	9.6	10.7	10.7
Conductivity ($\mu\text{mho}/\text{cm}$)	97	71	1381	1458	109	111
Width (m)	6.71	4.42	3.20	4.57	3.72	39.93
Avg. depth (m)	0.79	0.32	0.15	0.27	0.27	0.21
Flow (m^3/sec)	0.89	0.42	0.04	0.49	0.15	5.19
Alkalinity (mg $\text{CaCO}_3/1$)	4.1	3.1	3.1	7.2	23.8	21.7
Dissolved Al (mg/l)	0.5	0.17	0.18	0.20	0.32	0.15
NO_3^- -N (mg/l)	0.57	0.12	0.55	0.94	1.22	2.2
SO_4^{2-} (mg/l)	14	11	23	20	7	9

Note: NDT - Not determined because stream is tidal.

TABLE 7 (CONT.)

Parameter	Stream Name (and Site Number)					
	Great					
	Church Creek (13)	Winters Run (14)	Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	4 APR	4 APR	6 APR	6 APR	6 APR	6 APR
Time	0915	0800	1005	0915	0825	1150
Temp (C)	9.8	10.4	12.9	10.6	9.0	11.9
pH	5.8	5.7	6.0	5.9	6.0	5.9
DO (mg/l)	10.2	10.6	9.8	9.3	10.3	8.7
Conductivity ($\mu\text{mho}/\text{cm}$)	1489	98	164	105	77	71
Width (m)	NDT	22.40	4.88	NDT	7.32	14.02
Avg. depth (m)	NDT	0.70	0.15	NDT	0.18	0.47
Flow (m^3/sec)	NDT	2.08	0.21	NDT	0.36	1.81
Alkalinity (mg $\text{CaCO}_3/1$)	19.7	17.6	31.0	11.4	11.4	6.2
Dissolved Al (mg/l)	0.6	1.2	0.24	0.23	0.21	0.26
NO_3^- -N (mg/l)	0.24	1.36	2.7	1.33	0.62	0.99
SO_4^{2-} (mg/l)	11	10	19	14	10	11

Parameter	Stream Name (and Site Number)				
	Granny				
	Morgan Creek (19)	Herring Branch (20)	Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	6 APR	6 APR	6 APR	6 APR	6 APR
Time	1350	1102	1450	1530	1651
Temp (C)	11.8	12.8	10.9	11.8	11.7
pH	5.9	6.0	6.2	6.0	6.1
DO (mg/l)	8.8	9.3	9.1	8.8	9.7
Conductivity ($\mu\text{mho}/\text{cm}$)	139	69	129	94	113
Width (m)	4.33	2.83	4.88	15.39	4.27
Avg. depth (m)	0.36	0.31	0.41	0.78	0.47
Flow (m^3/sec)	0.22	0.20	0.34	7.65	0.24
Alkalinity (mg $\text{CaCO}_3/1$)	29.0	10.3	24.0	8.3	7.2
Dissolved Al (mg/l)	0.28	0.25	0.28	0.7	0.20
NO_3^- -N (mg/l)	1.9	0.80	2.8	0.92	6.2
SO_4^{2-} (mg/l)	8	10	11	17	9

TABLE 8 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL
ZONE STREAMS DURING THE WEEK OF 10-16 APRIL 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman Creek Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	12 APR	12 APR	12 APR	12 APR	12 APR	11 APR
Time	0845	0755	1017	1130	1245	1137
Temp (C)	8.8	7.5	11.6	13.0	12.2	10.0
pH	4.5	4.8	4.8	4.9	4.8	5.6
DO (mg/l)	10.4	12.1	11.4	11.0	10.5	11.0
Conductivity ($\mu\text{mho}/\text{cm}$)	41	65	71	120	124	104
Width (m)	9.60	3.35	3.66	5.94	6.70	4.11
Avg. depth (m)	0.82	0.19	0.23	1.04	0.66	0.28
Flow (m^3/sec)	2.65	0.23	0.43	0.83	2.40	0.51
Alkalinity (mg $\text{CaCO}_3/1$)	1.6	4.1	5.2	17.6	7.2	13.0
Dissolved Al (mg/l)	0.7	0.4	0.4	0.3	1.2	0.7
NO_3^- -N (mg/l)	<0.01	0.56	0.32	0.11	0.96	0.64
SO_4^{2-} (mg/l)	9	10	9	17	20	11

Parameter	Stream Name (and Site Number)					
	Severn Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	11 APR	11 APR	11 APR	11 APR	11 APR	11 APR
Time	1240	1335	1545	1450	0736	0830
Temp (C)	9.6	10.7	12.5	10.6	8.3	8.1
pH	5.3	5.0	4.7	4.8	5.5	5.7
DO (mg/l)	10.9	10.2	10.0	10.6	11.7	11.6
Conductivity ($\mu\text{mho}/\text{cm}$)	68	53	81	86	107	94
Width (m)	NDF	4.57	3.96	5.49	3.96	39.93
Avg. depth (m)	NDF	0.66	0.29	0.48	0.33	0.30
Flow (m^3/sec)	NDF	1.74	0.27	1.60	0.43	12.98
Alkalinity (mg $\text{CaCO}_3/1$)	6.2	2.1	2.6	5.7	22.0	17.6
Dissolved Al (mg/l)	1.8	1.2	1.0	1.8	0.8	1.2
NO_3^- -N (mg/l)	0.31	0.10	0.31	0.70	1.1	1.7
SO_4^{2-} (mg/l)	11	10	16	16	8	8

Note: NDF - Not determined because of flooding.

NDT - Not determined because stream is tidal.

TABLE 8 (CONT.)

Parameter	Stream Name (and Site Number)					
	Great					
	Church Creek (13)	Winters Run (14)	Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	11 APR	11 APR	13 APR	13 APR	13 APR	13 APR
Time	0920	0947	0940	0910	0825	1105
Temp (C)	8.2	8.5	11.0	8.8	7.0	12.2
pH	5.8	5.4	7.5	7.6	7.8	7.2
DO (mg/l)	11.7	11.9	10.9	10.2	11.5	10.1
Conductivity ($\mu\text{mho}/\text{cm}$)	86	85	120	91	76	57
Width (m)	NDT	22.86	5.18	NDT	7.31	15.24
Avg. depth (m)	NDT	0.87	0.19	NDT	0.20	0.87
Flow (m^3/sec)	NDT	5.56	0.26	NDT	0.50	4.36
Alkalinity (mg $\text{CaCO}_3/1$)	18.6	15.0	22.8	9.3	10.4	5.2
Dissolved Al (mg/l)	1.0	2.9	2.0	1.1	0.2	0.7
NO_3^- -N (mg/l)	0.30	0.98	1.3	1.1	0.61	0.71
SO_4^{2-} (mg/l)	8	9	12	11	10	9

Parameter	Stream Name (and Site Number)				
	Granny				
	Morgan Creek (19)	Herring Branch (20)	Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	13 APR	13 APR	13 APR	13 APR	13 APR
Time	1205	1045	1310	1410	1525
Temp (C)	11.1	11.3	12.3	12.8	14.4
pH	7.4	7.6	7.4	7.6	7.4
DO (mg/l)	10.2	11.0	10.7	9.4	10.7
Conductivity ($\mu\text{mho}/\text{cm}$)	147	55	136	77	149
Width (m)	4.27	2.90	5.03	15.24	4.72
Avg. depth (m)	0.38	0.44	0.57	1.38	0.66
Flow (m^3/sec)	0.31	0.38	0.66	17.52	0.39
Alkalinity (mg $\text{CaCO}_3/1$)	29.0	7.2	21.0	6.2	7.2
Dissolved Al (mg/l)	1.6	0.7	0.3	1.3	0.3
NO_3^- -N (mg/l)	2.7	0.62	2.6	0.74	6.1
SO_4^{2-} (mg/l)	9	9	11	14	9

TABLE 9 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL ZONE STREAMS DURING THE WEEK OF 17-23 APRIL 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman Creek					
	Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	18 APR	18 APR	18 APR	18 APR	18 APR	18 APR
Time	1200	1100	1334	1445	1540	0935
Temp (C)	9.3	8.2	12.5	12.3	11.1	10.2
pH	5.4	5.4	5.2	5.5	5.4	5.3
DO (mg/l)	11.0	12.5	11.6	11.4	11.9	11.1
Conductivity ($\mu\text{mho}/\text{cm}$)	37	57	56	109	123	96
Width (m)	9.60	3.20	3.66	NDE	NDE	3.96
Avg. depth (m)	0.60	0.21	0.21	NDE	NDE	0.18
Flow (m^3/sec)	0.93	0.15	0.44	NDE	NDE	0.20
Alkalinity (mg $\text{CaCO}_3/1$)	0.3	0.3	11.8	16.6	8.3	13.4
Dissolved Al (mg/l)	0.7	0.1	1.0	0.2	0.2	1.6
NO_3^- -N (mg/l)	0.05	1.1	0.57	0.15	2.3	0.72
SO_4^{2-} (mg/l)	11	11	11	18	25	16

Parameter	Stream Name (and Site Number)					
	Severn Run					
	Severn Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	19 APR	19 APR	18 APR	18 APR	19 APR	19 APR
Time	0845	0750	1614	1700	1057	1150
Temp (C)	8.4	6.5	12.0	10.5	7.6	8.1
pH	5.4	4.9	5.1	5.5	5.6	5.6
DO (mg/l)	11.4	11.9	12.7	11.7	12.5	12.2
Conductivity ($\mu\text{mho}/\text{cm}$)	88	60	88	103	98	100
Width (m)	NDE	4.42	3.35	4.72	3.90	39.92
Avg. depth (m)	NDE	0.35	0.17	0.31	0.30	0.27
Flow (m^3/sec)	NDE	0.48	0.10	0.86	0.19	10.33
Alkalinity (mg $\text{CaCO}_3/1$)	5.2	2.1	2.1	7.2	22.8	17.6
Dissolved Al (mg/l)	0.5	0.1	0.1	0.1	0.2	0.1
NO_3^- -N (mg/l)	0.82	0.18	1.4	1.9	1.4	2.8
SO_4^{2-} (mg/l)	17	14	26	22	9	10

Note: NDE - Not determined because of equipment malfunction.
NDT - Not determined because stream is tidal.

TABLE 9 (CONT.)

Parameter	Stream Name (and Site Number)					
	Church Creek (13)	Winters Run (14)	Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	19 APR	19 APR	20 APR	20 APR	20 APR	20 APR
Time	1230	1250	0947	0910	0825	1105
Temp (C)	7.7	8.6	7.7	5.3	4.6	6.0
pH	5.7	5.6	5.6	5.6	5.6	5.5
DO (mg/l)	12.7	12.1	12.1	12.7	13.9	12.6
Conductivity ($\mu\text{mho}/\text{cm}$)	103	102	126	88	78	60
Width (m)	NDT	NDE	5.33	NDT	7.47	14.32
Avg. depth (m)	NDT	NDE	0.18	NDT	0.21	0.62
Flow (m^3/sec)	NDT	NDE	0.33	NDT	0.50	3.11
Alkalinity (mg CaCO_3/l)	22.8	22.8	21.7	10.3	10.3	10.3
Dissolved Al (mg/l)	0.3	0.2	0.6	0.4	0.2	0.9
NO_3^- -N (mg/l)	0.28	2.0	2.0	1.5	0.61	1.4
SO_4^{2-} (mg/l)	11	13	17	14	12	12

Parameter	Stream Name (and Site Number)				
	Morgan Creek (19)	Herring Branch (20)	Granny Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	20 APR	20 APR	20 APR	20 APR	20 APR
Time	1200	1030	1305	1405	1535
Temp (C)	6.3	7.2	6.2	7.3	9.5
pH	5.5	5.6	5.7	5.4	5.2
DO (mg/l)	12.0	12.0	12.5	11.8	11.6
Conductivity ($\mu\text{mho}/\text{cm}$)	133	55	131	76	127
Width (m)	4.27	2.83	5.03	15.24	4.57
Avg. depth (m)	0.38	0.43	0.49	1.05	0.65
Flow (m^3/sec)	0.27	0.30	0.52	9.66	0.42
Alkalinity (mg CaCO_3/l)	29.0	10.3	11.4	6.2	5.2
Dissolved Al (mg/l)	0.5	0.3	0.6	0.8	0.3
NO_3^- -N (mg/l)	2.4	1.0	2.8	1.1	6.0
SO_4^{2-} (mg/l)	12	12	13	17	11

TABLE 10 WATER QUALITY AND STREAMFLOW DATA FOR 23 MARYLAND COASTAL
ZONE STREAMS DURING THE WEEK OF 24-30 APRIL 1983

Parameter	Stream Name (and Site Number)					
	Mattawoman					
	Nanjemoy Creek (1)	Unnamed Tributary (2)	Wheatley Run (3)	Plum Point Creek (4)	Lyons Creek (5)	Magothy River (6)
Date	30 APR	30 APR	30 APR	30 APR	30 APR	29 APR
Time	1015	0900	1115	1230	1320	1340
Temp (C)	18.2	14.4	16.4	18.4	17.4	19.4
pH	6.4	6.4	6.5	6.8	6.6	6.7
DO (mg/l)	5.5	10.3	10.3	11.9	10.0	9.9
Conductivity ($\mu\text{mho}/\text{cm}$)	52	64	68	136	153	143
Width (m)	9.44	3.35	2.66	3.66	5.03	3.96
Avg. depth (m)	0.65	0.15	0.12	0.28	0.48	0.16
Flow (m^3/sec)	0.25	0.07	0.19	0.34	1.29	0.16
Alkalinity (mg CaCO_3/l)	6.6	11.0	7.7	23.0	10.0	14.2
Dissolved Al (mg/l)	0.50	0.25	0.68	0.32	0.18	0.87
NO_3^- -N (mg/l)	0.12	0.55	0.41	0.11	1.1	0.95
SO_4^{2-} (mg/l)	8	10	10	17	26	18

Parameter	Stream Name (and Site Number)					
	Severn Run (7)	North River (8)	Muddy Creek (9)	Stocketts Run (10)	Broad Run (11)	Deer Creek (12)
Date	29 APR	29 APR	29 APR	29 APR	29 APR	29 APR
Time	1415	1530	1700	1615	0800	0955
Temp (C)	17.3	21.0	20.5	17.0	12.5	14.6
pH	7.0	6.8	6.6	7.0	6.5	6.6
DO (mg/l)	9.2	10.6	10.7	9.9	11.1	10.8
Conductivity ($\mu\text{mho}/\text{cm}$)	107	75	124	117	119	111
Width (m)	6.10	4.72	3.20	4.57	3.87	39.93
Avg. depth (m)	0.76	0.30	0.13	0.23	0.26	0.21
Flow (m^3/sec)	0.92	0.39	0.06	0.50	0.16	7.25
Alkalinity (mg CaCO_3/l)	10.0	5.5	4.4	9.0	28.5	17.5
Dissolved Al (mg/l)	0.55	0.14	0.32	0.21	0.31	0.13
NO_3^- -N (mg/l)	0.93	0.19	0.66	0.88	1.3	3.0
SO_4^{2-} (mg/l)	15	14	27	23	7	8

Note: NDT - Not determined because stream is tidal.

TABLE 10 (CONT.)

Parameter	Stream Name (and Site Number)					
	Church Creek (13)	Winters Run (14)	Great Bohemia Creek (15)	Long Branch (16)	Stony Run (17)	Cypress Branch (18)
Date	29 APR	29 APR	1 MAY	1 MAY	1 MAY	1 MAY
Time	1030	1130	0925	0900	0815	1040
Temp (C)	18.2	16.5	19.4	17.1	15.3	19.5
pH	6.7	6.9	6.5	6.4	6.5	6.3
DO (mg/l)	8.4	11.0	9.3	8.2	10.0	7.3
Conductivity ($\mu\text{mho}/\text{cm}$)	138	117	169	125	85	9.6
Width (m)	NDT	22.40	4.88	NDT	7.31	13.72
Avg. depth (m)	NDT	0.74	0.19	NDT	0.16	0.43
Flow (m^3/sec)	NDT	4.02	0.26	NDT	0.32	1.48
Alkalinity (mg $\text{CaCO}_3/1$)	1.1	19.0	29.6	14.2	13.1	12.0
Dissolved Al (mg/l)	0.70	0.23	0.25	0.30	0.19	0.58
NO_3^- -N (mg/l)	0.62	2.0	2.9	1.8	0.86	1.3
SO_4^{2-} (mg/l)	11	9	18	14	4	10

Parameter	Stream Name (and Site Number)				
	Morgan Creek (19)	Herring Branch (20)	Granny Finley Branch (21)	Choptank River (22)	Tull Branch (23)
Date	1 MAY	1 MAY	1 MAY	1 MAY	1 MAY
Time	1140	1010	1300	1410	1520
Temp (C)	18.4	20.2	18.7	20.3	18.6
pH	6.4	6.3	6.6	6.4	6.6
DO (mg/l)	7.6	8.3	9.4	8.1	8.9
Conductivity ($\mu\text{mho}/\text{cm}$)	140	9.5	159	112	151
Width (m)	4.30	2.74	4.88	15.24	4.30
Avg. depth (m)	0.37	0.36	0.43	0.74	0.47
Flow (m^3/sec)	0.22	0.15	0.29	5.88	0.20
Alkalinity (mg $\text{CaCO}_3/1$)	3.40	29.6	29.6	12.0	12.0
Dissolved Al (mg/l)	0.34	0.55	0.28	0.62	0.20
NO_3^- -N (mg/l)	2.1	1.3	3.3	1.1	6.6
SO_4^{2-} (mg/l)	7	10	10	16	9

TABLE 11 WATER QUALITY AND STREAMFLOW DATA FOR BROAD RUN,
CHURCH CREEK, AND DEER CREEK, 7 MARCH 1983

<u>Parameter</u>	Stream Name (and Site Number)		
	Broad Run (11)	Church Creek (12)	Deer Creek (13)
Time	0835	1240	1050
Temp (C)	8.7	9.8	9.4
pH	6.5	7.1	7.1
D0 (mg/l)	11.2	11.6	12.0
Conductivity ($\mu\text{mho}/\text{cm}$)	125	191	127
Width (m)	4.27	NDT	28.96
Avg. depth (m)	0.20	NDT	0.39
Flow (m^3/sec)	0.13	NDT	6.01
Alkalinity (mg CaCO_3/l)	26.2	26.5	30.2
Dissolved Al (mg/l)	0.8	0.28	0.16
NO_3^- -N (mg/l)	1.02	0.30	2.4
SO_4^{2-} (mg/l)	10	12	8

Note: NDT - not determined because stream is tidal.

TABLE 12 WATER QUALITY AND STREAMFLOW DATA FOR BROAD RUN,
CHURCH CREEK, AND DEER CREEK, 18 MARCH 1983

<u>Parameter</u>	Stream Name (and Site Number)		
	Broad Run (11)	Church Creek (12)	Deer Creek (13)
Time	1255	1530	1408
Temp (C)	8.0	8.2	7.6
pH	6.7	6.6	6.8
D0 (mg/l)	12.1	11.9	12.2
Conductivity ($\mu\text{mho}/\text{cm}$)	117	303	126
Width (m)	3.56	NDT	39.92
Avg. depth (m)	0.31	NDT	0.12
Flow (m^3/sec)	0.22	NDT	1.93
Alkalinity (mg CaCO_3/l)	25.6	33.1	24.4
Dissolved Al (mg/l)	0.29	0.19	0.07
NO_3^- -N (mg/l)	1.26	0.28	2.8
SO_4^{2-} (mg/l)	8	24	8

Note: NDT - Not determined because stream is tidal.

TABLE 13 WATER QUALITY AND STREAMFLOW DATA FOR BROAD RUN,
CHURCH CREEK, AND DEER CREEK, 21 MARCH 1983

<u>Parameter</u>	Stream Name (and Site Number)		
	Broad Run (11)	Church Creek (12)	Deer Creek (13)
Time	0800	1330	1130
Temp (C)	9.9	10.0	10.5
pH	6.2	6.5	6.4
D0 (mg/l)	9.7	11.3	10.6
Conductivity ($\mu\text{mho}/\text{cm}$)	78	49	109
Width (m)	5.18	NDT	39.92
Avg. depth (m)	0.47	NDT	0.46
Flow (m^3/sec)	1.40	NDT	27.82
Alkalinity (mg CaCO_3/l)	14.5	12.4	16.6
Dissolved Al (mg/l)	1.3	1.1	3.4
NO_3^- -N (mg/l)	0.48	0.74	2.1
SO_4^{2-} (mg/l)	10	10	10

Note: NDT - Not determined because stream is tidal.